

CLAIMS

What is claimed is:

5 1. A method for establishing a virtual path within a
6 frame relay network wherein frames are transmitted over a
7 plurality of virtual circuits from a first switching node
8 to a second switching node, said methods comprising:

9 transmitting by said first switching node to said
10 second switching node, a first control message requesting
11 a virtual path be established, and specifying two or more
12 virtual circuits to be combined to form said virtual
13 path;

14 receiving a frame, at said second switching node,
15 wherein said frame has an identifier corresponding to
16 said virtual path; and

17 forwarding said frame, utilizing said second
18 switching node, to a destination determined based on said
19 two or more said virtual circuits specified in said first
20 control message.

1 2. The methods of claim 1, wherein said step of
2 transmitting said first control message includes the step
3 Of handling a data link connection identifier,
4 corresponding to a predetermined value, for identifying
5 said purpose of first control message.

1 3. The method of claim 1, wherein said step of
2 transmitting said first control message includes the step
3 Of transmitting a field for identifying each of said two
4 or more said virtual circuits.

1 4. The method of claim 1, wherein said step of
2 transmitting said first control message includes the step
3 of transmitting information specifying said virtual path,
4 wherein said information is comprised of:

5 a source virtual circuit identifier, which
6 corresponds to an input adapter of said first switching
7 node;

8 a source port identifier, which corresponds to an
9 input port of said first switching node;

10 a destination virtual circuit identifier, which
11 corresponds to an output adapter of said second switching
12 node; and

13 a destination port identifier, which corresponds to
14 an output port of said second switching node.

1 5. The method of claim 1, further comprising the step
2 of:

3 transmitting by said second switching node to said
4 first switching node, a second control message conveying
5 acknowledgment of said request to establish said virtual

6 path or rejection of said request to establish said
7 virtual path.

1 6. The method of claim 5, further comprising the step
2 of:

3 transmitting to said first switching node to said
4 second switching node, a third control message
5 acknowledging a reception of said second control message
6 by said first switching node.

7. The method of claim 1, further comprising the step
of:

starting a timeout timer, by said first switching
node, when said first control message is transmitted;

detecting an error when said timeout timer expires
prior to receiving a second control message from said
second switching node, wherein said second control
message conveys acknowledgment of said request to
establish said virtual path or rejection of said request
to establish said virtual path.

1 8. The method of claim 1, further comprising the step
2 of:

3 transmitting to said second switching node, a forth
4 control message, sent by said first switching network,

5 for removing one of said two or more virtual circuits
6 from said virtual path.

1 9. The method of claim 1, further comprising the step
2 of:

3 transmitting to said second switching, a fifth
4 control message, sent by said first switching network,
5 for canceling said virtual path.

6 10. The method of claim 8, further comprising the step
7 of:

8 starting a plurality of activities timers, wherein
9 each of said two or more virtual circuits combined to
10 form said virtual path corresponds to one of said
11 activities timers;

12 resetting, for each frame received for said two or
13 more virtual circuits combined to form said virtual path,
14 the corresponding said activity-timer;

15 detecting, by the expiration of one of said
16 activity-timers, an extended period of non-activity by
17 one of said virtual circuits which correspond to said
18 expired activity-timer; and

transmitting to said second switching node, a forth control message, sent by said first switching network, for removing from said virtual path, said virtual circuit corresponding to said expired activity-timer.

11. A system for establishing a virtual path within a frame relay, said system comprising:

a frame relay network including a plurality of virtual circuits for transmitting frames from a first switching node to a second switching node;

a virtual path established by a first control message transmitted by said first switching node to said second switching node, defining a virtual path, and specifying two or more virtual circuits to be combined to form said virtual path;

a frame, having an identifier corresponding to said defined virtual path, received by said second switching node and then forward said frame to a destination determined by said two or more virtual circuits specified in said control message.

12. The system of claim 11, wherein said control message includes a data link connection identifier, corresponding to a predetermined value, for identifying said purpose of first control message.

1 13. The system of claim 11, wherein said control message
2 includes a field for identifying each of said two or more
3 virtual circuits.

1 14. The system of claim 11, wherein said first control
2 message includes information specifying said virtual
3 path, wherein said information is comprised of:

4 a source virtual circuit identifier, which
5 corresponds to the input adapter of said first switching
6 node;

7 a source port identifier, which corresponds to the
8 input port of said first switching node;

9 a destination virtual circuit identifier, which
10 corresponds to the output adapter of said second
11 switching node; and

12 a destination port identifier, which corresponds to
13 the output port of said second switching node.

1 15. The system of claim 11, further comprising:

2 a second control message transmitted by said second
3 switching node to said first switching node, conveying
4 acknowledgment of said request to establish said virtual
5 path or rejection of said request to establish said
6 virtual path.

1 16. The system of claim 15, wherein said first switching
2 node is adapted to transmit in response to said second
3 control message, to said second switching node a third
4 control message acknowledging a reception of said second
5 control message by said first switching node.

1 17. The system of claim 11, further comprising:

2
3 a timeout timer, set by said first switching node
4 when said first control message is transmitted;

5
6 detecting an error when said timeout timer expires
7 prior to receiving a second control message from said
8 second switching node, wherein said second control
9 message conveys acknowledgment of said request to
10 establish said virtual path or rejection of said request
11 to establish said virtual path.

12 18. The system of claim 11, further comprising:

13
14 a forth control message transmitted by said first
15 switching node to said second switching node, for
16 removing one of said two or more virtual circuits from
17 said virtual path.

1 19. The method of claim 11, wherein said first switching
2 node is adapted to transmit to said second switching, a
3 fifth control message, for canceling said virtual path.

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a forth control message, sent by said first switching network in response to said error condition signal, for removing from said virtual path, said virtual circuit corresponding to said expired activity-timer.